Department of Planning and Environment

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West Schofields

Flood Planning Advice Report

David Gainsford (Chair)
Sheridan Coakes
Chris Wilson

18 May 2023

Acknowledgement of Country

The Department of Planning and Environment acknowledges that it stands on Aboriginal land. We acknowledge the Traditional Custodians of the land, and we show our respect for Elders past, present and emerging through thoughtful and collaborative approaches to our work, seeking to demonstrate our ongoing commitment to providing places in which Aboriginal people are included socially, culturally, and economically.

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West Schofields

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Contents

Acknowledgement of Country **2**
Contents **3**
Defined terms **4**
1 Introduction **5**
1.1 Advice Request 5
1.2 Material considered by the Panel 6
1.3 The Panel's meetings 6
2 State-led Rezoning **7**
2.1 Site and locality 7
2.2 State-led Rezoning 9
3 The Panel's consideration **11**
3.1 Key issues 11
3.1.1 Flood modelling, hazard, and behaviour 11
3.1.2 Flood Evacuation 15
3.1.3 Mitigation Measures 19
4 The Panel's Advice **20**
Appendix A – Material considered by the Panel **22**

Defined terms

Term	Definition
AEP	Annual Exceedance Probability
Council	Blacktown City Council
Department	Department of Planning and Environment
Developer	CSR Limited (southern part of the West Schofields Precinct)
FEM	*Hawkesbury-Nepean Valley Flood Evacuation Model Report*, July 2022
Flood Inquiry	NSW Flood Inquiry (July 2022)
INSW	Infrastructure NSW
Interim Results	draft *Hawkesbury-Nepean Flood Study*, April 2022
LGA	Local Government Area
Material	Material considered by the Flood Advisory Panel
NWGA	North West Growth Area
Panel	Flood Advisory Panel
PLUS	Department's Planning and Land Use Strategy team
PMF	Probable Maximum Flood
SES	NSW State Emergency Service
TAG	Technical Advisory Group
TAR	Technical Advisory Report
TfNSW	Transport for NSW
v/l/h	vehicle/lane/hour
WSP	West Schofields Precinct

1 Introduction

1. The Department of Planning and Environment (**Department**) established Flood Advisory Panels to provide advice regarding the flood risk associated with certain 'high risk' planning proposals and other planning-related matters, in light of the recommendations of the NSW Flood Inquiry 2022 (**Flood Inquiry**). The panel review process for these matters was intended as an interim measure pending the establishment of the NSW Reconstruction Authority, in accordance with the Flood Inquiry recommendations.
2. In addition, a Technical Advisory Group (**TAG**) was established by the Department to deliver expert technical advice to the Flood Advisory Panels in accordance with the TAG terms of reference (dated 12 December 2022). The advice of the TAG is not binding on the panels nor on the Department's Planning and Land Use Strategy division (**PLUS**), which remains the delegated decision maker for the planning proposals referred to the panels.
3. The West Schofields Precinct (**WSP**) was "released for planning" in two stages. The first stage, the southern part of the WSP (south of South Street), was released in August 2016 under a Precinct Acceleration Protocol with CSR Limited (**Developer**) being the majority landowner and proponent. The remainder of the WSP was released in May 2017, to enable a holistic approach to master planning in the precinct.
4. The WSP rezoning proposal seeks to provide additional housing, open space, green links, a local centre, a potential new primary school and biodiversity and heritage protection provisions.
5. On 12 January 2023, the West Schofields Flood Advisory Panel (**Panel**) received a referral from PLUS requesting flood related advice for the state led rezoning of the WSP, which is detailed in Section 1.1 below.
6. The Department's Deputy Secretary David Gainsford (Chair), and independent members Dr Sheridan Coakes and Chris Wilson have been appointed to constitute the Panel with respect to this request.

1.1 Advice Request

7. PLUS requested the Panel provide advice and recommendations on how to proceed with the WSP rezoning proposal, considering the flood and evacuation matters, with possible options being:
   - Proceed to finalisation in advance of the implementation of recommendations 18 and 19 of the Flood Inquiry
   - Proceed with certain aspects of the WSP rezoning proposal
   - Proceed with the WSP rezoning proposal under certain conditions.
8. PLUS also requested the Panel specifically consult with the following stakeholders as part of considering the rezoning proposal:
   - Transport for New South Wales (**TfNSW**)
   - CSR Limited.

1.2 Material considered by the Panel

9. In preparing this advice to PLUS, the Panel reviewed the material (**Material**) submitted with the rezoning proposal (see Appendix A), met with key stakeholders, visited the WSP and sought advice from the TAG.

10. The TAG was requested to advise whether the WSP rezoning proposal adopts a tolerable, risk-based flood planning level considering the Material in Appendix A. The TAG's advice is summarised in the Technical Advice Report (**TAR**), dated 11 May 2023. The TAG advice is a compilation from several independent experts.

11. The Panel also received written advice from two NSW Government agencies, NSW State Emergency Service (**SES**) and Infrastructure NSW (**INSW**).

12. The Panel also considered additional updated flood information provided by the Developer on 14 March 2023 (see Appendix A).

13. In addition, the Panel has also considered the conclusions of the following Hawkesbury-Nepean Flood Studies:

    - *Hawkesbury-Nepean Valley Flood Evacuation Model Report* (prepared by INSW, dated July 2022) (**FEM**)
    - *Hawkesbury-Nepean Valley Regional Flood Study* (prepared by INSW and WMA Water, dated July 2019) (HNV Regional Flood Study)
    - Draft *Hawkesbury -Nepean Flood Study – Interim Results* (prepared by INSW, dated April 2022) (**Interim Results**)
    - *Climate Change and Flooding Effects on the Hawkesbury-Nepean* (prepared by WMA Water, September 2021)

14. To date, the FEM has not been made publicly available and the Interim Results have limited circulation amongst NSW Government agencies and targeted council's and stakeholders. However, these resources are considered particularly relevant to the Panels consideration of the WSP, as the latest and most current NSW Government flood modelling for the Hawkesbury-Nepean catchment.

15. The FEM was developed through an expert-led interagency government process to assess cumulative regional road network capacity during a flood evacuation based on the SES Flood Plan arrangements. The FEM simulates the SES evacuation timeline and arrangements under a range of assumptions. It provides the NSW Government with a repeatable process to quantify existing and ongoing risk associated with the cumulative impact of growth and climate change on road evacuation capacity in the Hawkesbury-Nepean Valley.

1.3 The Panel's meetings

16. As part of its advice, the Panel met with various stakeholders as set out in Table 1.

Table 1 – Panel's Key Stakeholder Meetings

Meeting	Date
Site Inspection	20 February 2023
Department (PLUS)	1 March 2023
Council	1 March 2023
Developer (southern part)	1 March 2023
Transport for NSW	21 March 2023

2 State-led Rezoning

2.1 Site and locality

17. The WSP is one of 16 precincts within the NWGA, which was established by the NSW Government under *State Environmental Planning Policy (Sydney Region Growth Centres) 2006* as an area for greenfield urban development including housing, employment, retail, health and education facilities, parks, bushland, and new or upgraded infrastructure.

18. The WSP adjoins Marsden Park North and Riverstone West Precincts to the north, Schofields and Riverstone Precincts to the east, Marsden Park and Marsden Park Industrial Precincts to the west and Colebee Precinct to the south.

19. The WSP is located within the Blacktown Local Government Area, approximately 40 km northwest of the Sydney CBD, 18 km from Parramatta CBD and 7 km from Windsor.

20. The WSP is approximately 576 hectares (ha) in size and predominantly characterised by rural-residential properties, low intensity agriculture (such as market gardens, poultry sheds, and a mushroom grower), commercial activities and rural industries (see Figure 1). There are approximately 300 landowners and 573 existing dwellings within the WSP, with the Developer being the majority landholder in the southern part of the precinct. The CSR quarry and brick works is located in the southern part of the precinct and there are also three former landfill sites within the precinct.

21. The WSP is subject to flooding due to its proximity to Eastern Creek and Bells Creek, and its location within the Hawkesbury-Nepean River catchment.

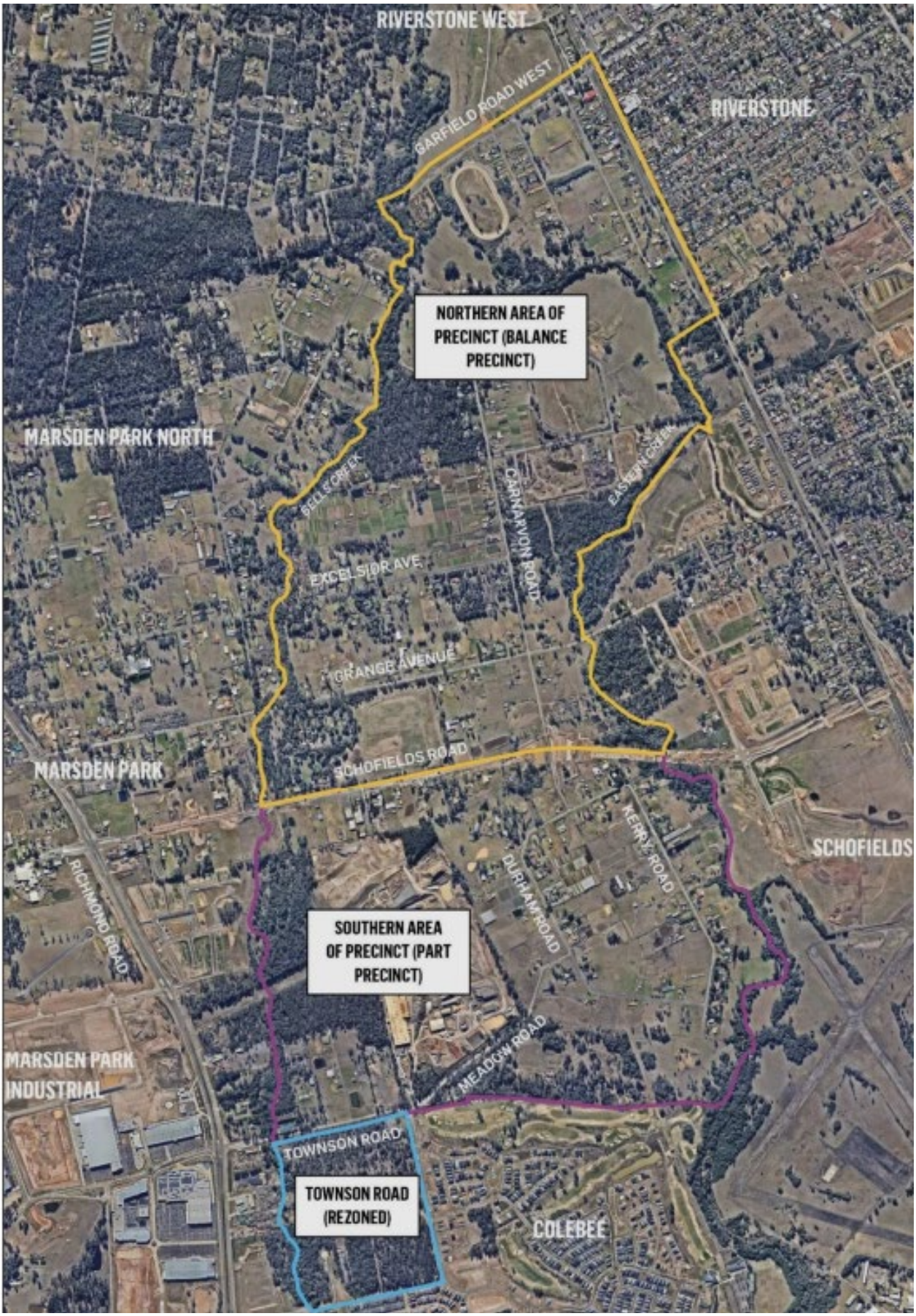


Figure 1: West Schofields Precinct Aerial Image (Department, August 2018)

2.2 State-led Rezoning

22. The WSP was "released for planning" in two stages. The first stage, the southern part of the precinct (south of South Street / Schofields Road), was released in August 2016 under a Precinct Acceleration Protocol with the majority landowner (CSR Limited) as the proponent under the Precinct Acceleration Protocol. The remainder of the precinct was released in May 2017, to enable a holistic approach to the master planning of the precinct.

23. The Townson Road Precinct located at the southern end of the WSP (see Figure 1) was rezoned by council in December 2016 to allow for approximately 336 dwellings.

24. The WSP rezoning proposal seeks to amend the *State Environmental Planning Policy (Precincts – Western Parkland City) 2021* (previously the *State Environmental Planning Policy (Sydney Region Growth Centres) 2006*). The amendments seek to establish an Indicative Layout Plan to accommodate up to 4,500 low to medium density dwellings, 42.7 ha of open space, a local centre, biodiversity and heritage protection areas, and the potential for a new school (see Figure 2 for further details).

25. The amendments include controls to ensure flood risk and resilience are considered for future development. This includes limiting the number of dwellings permitted below the PMF to 2,000 dwellings and preventing any additional dwellings below the 1% AEP flood level. The rezoning proposal also includes the *Blacktown City Council Growth Centre Precincts – Schedule 9 – West Schofields Precinct* which includes building resilience controls for development between the 1% AEP event and PMF.

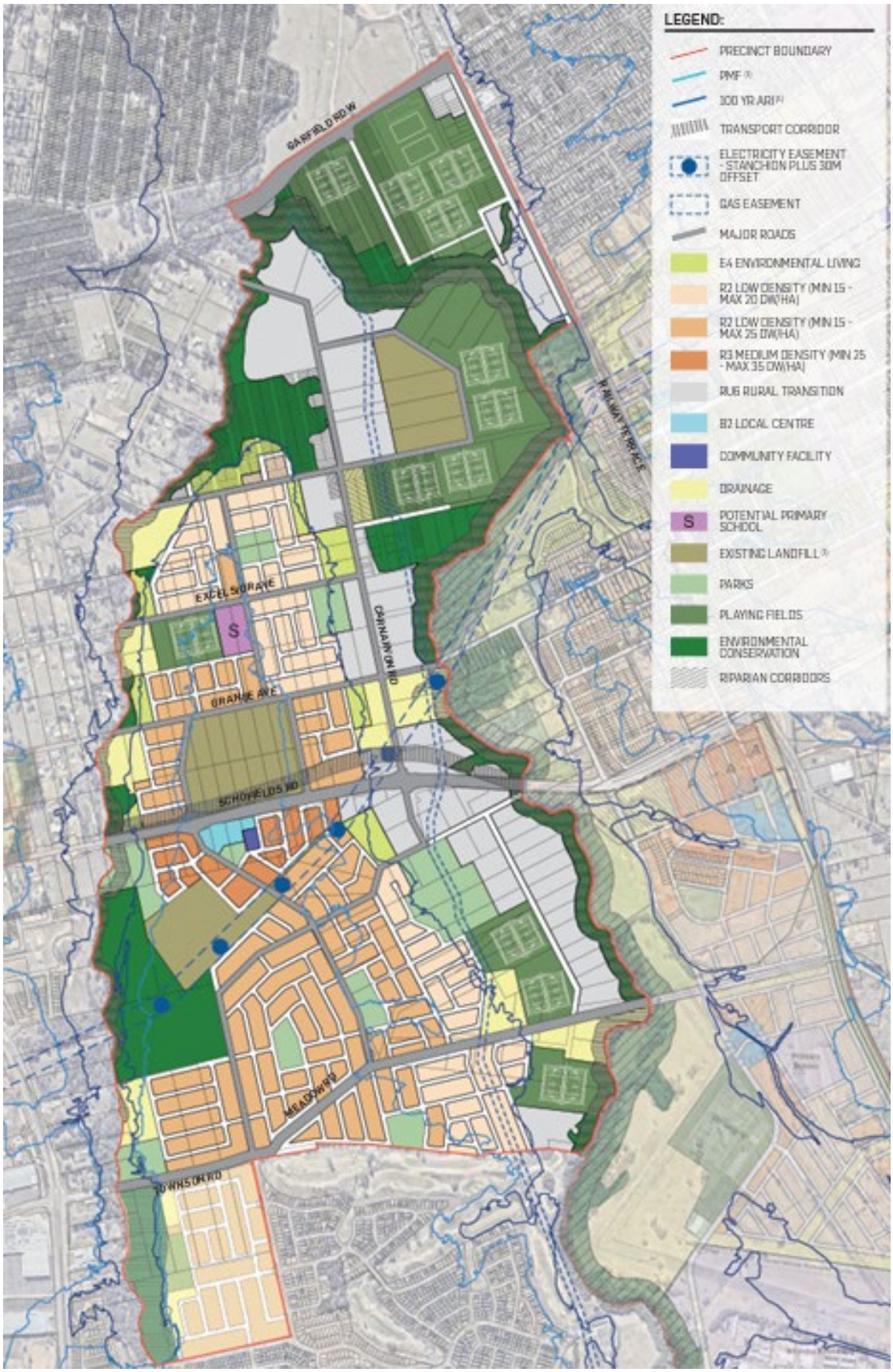


Figure 2: West Schofields Precinct Indicative Layout Plan (Department, August 2018)

3 The Panel's consideration

3.1 Key issues

26. The following section provides a summary of the key issues identified and considered by the Panel in response to the request for advice from PLUS.

3.1.1 Flood modelling, hazard, and behaviour

PLUS Comments

27. As part of the WSP rezoning proposal, the Department commissioned the following reports regarding flood risk:

- *West Schofields Flooding, Water Cycle Management and Riparian Corridor Assessment*, prepared by Calibre, 13 June 2018 (**Calibre 2018 Flood Study**).
- *NWGA – Marsden Park North, West Schofields & Vineyard (Stage 1) Precincts Flood Evacuation Study*, prepared by Stantec, 3 July 2018 (**Stantec Flood Evacuation Report**).

28. The Calibre 2018 Flood Study provided the following modelling of a range of flood events and their impacts on the WSP:

- **1% AEP event:** significant flooded areas at the northern end of the precinct with flood depths in areas exceeding 5 m near Eastern Creek. Large sections of this flooding are due to the terrain being situated lower than the 17.3 m (AHD) tail water present in the Hawkesbury River. This water will be of low velocity and enter Eastern Creek as historically the Hawkesbury River gradually fills during a regional 1% AEP flood due to down stream flow conditions.
- **0.2% AEP event:** significant flooded areas at the northern end of the precinct with flood depths in areas exceeding 5 m near Eastern Creek. Large sections of this flooding are due to the terrain being situated lower than the 20.2 m (AHD) tail water present in the Hawkesbury River. This water will be of low velocity and enter Eastern Creek as historically the Hawkesbury River gradually fills during a regional 0.2% AEP flood due to down stream flow conditions.
- **PMF:** significant flooded area at the northern end of the precinct with flood depths in areas exceeding 5 m near Eastern Creek. Large sections of this flooding are due to the terrain being situated lower than the 26.4 m (AHD) tail water present in the Hawkesbury River. This water will be of low velocity and enter Eastern Creek as historically the Hawkesbury River gradually fills during a regional PMF flood due to down stream flow conditions.

29. In its meeting with the Panel on 1 March 2023, PLUS noted:

- In light of the Interim Results, which are yet to be released, increases in the levels of flood events for the Hawkesbury-Nepean may impact the WSP.
- Increases in the 1% AEP level may result in the need to convert residential land below the updated 1% AEP level to other land uses or relocate dwelling footprints. Additionally, there may be reason to adjust densities following finalisation, particularly for development proposed on the fringe of the 1% AEP level.

Developer Comments

30. In its meeting with the Panel on 1 March 2023, the Developer advised that it initiated the rezoning of the southern part of the WSP (south of South Street/Schofields Road) under the Precinct Acceleration Protocol in 2016. The Developer noted that the southern part of the WSP has a lower flooding risk profile than the northern part.

31. The Developer noted the Calibre 2018 Flood Study shows that in the 1% AEP, 0.2% AEP and PMF events, large portions of the northern part of the WSP would be inundated, while in comparison, most of the land proposed to be rezoned and developed in the southern part remains largely unaffected.

32. Following its meeting with the Panel, the Developer submitted additional information in the form of updated flood evacuation reports:

- CSR West Schofields – Flood Evacuation Report, prepared by Calibre, February 2023 (**Developer's Flood Evacuation Report**).
- West Schofields Precinct: Flood Evacuation Model Review, prepared by Ason Group, 10 March 2023 (**Developer's FEM Review**)
- Submission to Flood Advisory Panel – West Schofields – Southern Part Precinct, prepared by Calibre, 14 March 2023 (**Developer's Submission**).

33. The Developer noted the additional information demonstrated that:

- Only 28% (777 of 2,744 dwellings) of the dwellings proposed for Stage 1 in the southern part of the WSP are below the PMF
- Most of the land proposed for residential development in southern part of the WSP is above the 0.2% AEP event.

Council Comments

34. In its meeting with the Panel on 1 March 2023, council noted:

- Development in the Hawkesbury-Nepean Valley is a complex matter, with some areas established in colonial times and has a long history of residential use.
- Council acknowledges that floods pose a serious risk to safety in the Hawkesbury-Nepean Valley. However, given the large difference between the 1% AEP and the PMF means that any change to the established flood planning levels has the potential to impact on a very large area and a sizeable proportion of the population.
- Any change to the long-established flood planning level of 1% AEP (plus freeboard) will need to be very clearly and carefully communicated to all affected landowners, as well as to the broader community and stakeholders.
- Any flood planning controls should be considered at a precinct specific level, tailored to the specifics of each location to incorporate impacts, such as backwater effects from the Hawkesbury-Nepean River in flood events.

TAG Advice

35. *Flood Impact Assessment*:

- The TAG was of the view the submitted flood modelling was incomplete. While events ranging from 50% AEP through to the 0.2% AEP, as well as the PMF were considered, the 0.02% AEP event has not been modelled as recommended by the Flood Inquiry.
- The TAG also noted the modelling was based on outdated data, using rainfall patterns as per *Australian Rainfall & Runoff* 1998 guidelines, which has since been superseded by *Australian Rainfall & Runoff* 2016, and is based on rainfall gauge data collected prior to 1983.

- The TAG noted that the Developer's Flood Evacuation Report does not appear to account for the Interim Results nor appropriately consider climate change impact.
- The TAG noted there is more recent flood data available, including the *Climate Change and Flooding Effects on* the *Hawkesbury-Nepean* (WMA Water, 2021) report, which includes information on Hawkesbury-Nepean tailwater levels for modelling and the Interim Results which indicates future flood levels within the Hawkesbury-Nepean catchment are likely to rise.
- The TAG also noted hazard mapping was not provided.

36. *Climate Change*:

- The TAG noted the flood modelling did not adequately consider the effects of climate change and as a result the analysis provided is likely to have underestimated the flood risk to the WSP.
- The TAG noted the flood modelling does not appropriately identify the impacts of climate change on the levels of Hawkesbury-Nepean tailwaters affecting the WSP during major flood events.

37. *Flood Hazard and Behaviour*:

- The TAG agreed the tolerance for 'risk to life' should be low, and 'developments must not result in increased risk to life'.
- The TAG noted that the majority of inundation impacting the WSP is due to backwater effects from the Hawkesbury-Nepean River, and this development does not affect flood conveyance in that system.
- The TAG noted that large sections of flood prone land would exceed 4 m in depth during the PMF event, with this depth associated with H6 (highest hazard rating level) conditions as per the Australian Institute for Disaster Resilience Flood Hazard Guideline.
- TAG members found that insufficient hazard information was provided by the Developer.

38. *Cumulative Hydraulic Impacts*:

- The TAG noted that the hydraulic impacts of the development on flooding were only considered for the 1% AEP event in the Calibre Flooding Assessment report, which is insufficient to understand off-site impacts.

Agency Advice

39. In advice provided to the Panel on 2 April 2023, SES noted:

- The *Hawkesbury-Nepean Valley Regional Flood Study* (INSW, 2019) indicates that much of the WSP is subject to hazard category H5-H6 flooding in a 0.2% AEP event. This is unsafe for all people, vehicles, and most buildings are susceptible to damage. Further, the Interim Results will also see this hazard increase, due to an increase in depth and more accurate assessment of velocities.
- The northern part of the WSP is of particular risk, as parts are low flood islands that lose access routes and then are subsequently inundated. Low flood islands represent a significant risk factor that would be best avoided for development due to the difficulties in large scale evacuation operations, resulting in a high risk of mass rescue.
- Climate change has not been considered in the available flood modelling.

40. In advice provided to the Panel on 27 March 2023, INSW noted:

- Climate change has not been considered in the available flood modelling.

- The rezoning has relied on existing regional flood studies, with impact assessment considering only the regional 1% AEP and PMF events. The rezoning needs to review regional and local floods up to and including the PMF, how these floods could be impacted by the development, and provide flood hazard, hydraulic categories, flood velocities, depths, and levels for all events.
- The Interim Results indicate that the flood levels have risen in the West Schofields area.

Panel Advice

41. The Panel acknowledges that the submitted flood studies may have been acceptable at the time the rezoning proposal was initially received by the Department. However, in light of recent flood events in this area, the findings of the Interim Results and the Flood Inquiry, the submitted flood studies are now considered to be out-of-date and create uncertainty about the flood risk.

42. The Panel share the TAG's concern that the submitted flood modelling is not sufficiently comprehensive, as it has not covered a full range of flooding scenarios, such as events between the 0.2% AEP and PMF, as recommended by the Flood Inquiry. The Panel considers the flood modelling is likely unrepresentative of future flooding scenarios given the Interim Results, and therefore flood risks are likely to be higher than previously anticipated.

43. Further, the Panel shares the concerns of the TAG that the lack of hazard mapping is a key deficiency in the flood impact assessment for the WSP. The known 'risk to life' from agency advice indicates the WSP may be exposed to significant flood depth during extreme flood events and experience hazard ratings of up to H6 for sections of the WSP (see paragraphs 37 and 39).

44. The Panel also shares the concerns of the TAG that the current modelling undertaken for the WSP has not adequately considered climate change and is likely to underestimate flood levels and 'risk to life' as a result.

45. In particular, the Panel notes members of the TAG have estimated that the PMF could be up to 4.2 m higher than those modelled by the Developer under the Interim Results.

46. The Panel recommends further information is required to provide greater certainty of 'risk to life', including modelling that reasonably considers the potential impacts of climate change, modelling of additional events between the 0.2% and PMF, hazard mapping for all modelled flood events, and is calibrated against recent flood events and the Interim Results.

3.1.2 Flood Evacuation

PLUS Comments

47. PLUS noted in its Referral to the Advisory Panel report that approximately 55,000 people would need to be evacuated from the Hawkesbury-Nepean Valley in a 1% AEP event, and that this increases to approximately 140,000 people in a PMF event.

48. The Referral to the Advisory Panel report noted that the FEM results show that subject to the delivery of supporting road upgrades, the WSP rezoning would not create significant additional evacuation risk to life for up to 2,300 dwellings below the PMF (including existing dwellings). It was noted the FEM results do not affect the number of proposed dwellings above the PMF as it is assumed these people do not need to evacuate during floods.

49. The Referral to the Advisory Panel report noted that for development to occur in parallel with the delivery of supporting road upgrades, it should occur in stages. The first stage could consist of approximately 700 dwellings in the southern part of the WSP. This would require a relatively small suite of road upgrades to provide for short-term evacuation and road capacity needs.

50. In its meeting with the Panel on 1 March 2023, PLUS noted that the Developer's staged proposal for the southern part of the WSP could be evacuated with upgrades to the road network (i.e. Townson Road/ Meadow Road Stage 1 upgrade). However, subsequent stages would require more substantial upgrades to the road network to support evacuation, which are yet to be funded.

51. However, PLUS noted that if the WSP was to proceed in parallel with the remaining precincts in the NWGA there is estimated to be a 20% increase in risk-to-life by 2041, for the combined precincts of Riverstone Town Centre, West Schofield, and 1,700 dwellings below the PMF in Marsden Park North.

Developer Comments

52. The Developer in its meeting with the Panel on 1 March 2023 noted that as the majority landowner within the southern part of the WSP, it could be the driver in establishing the required infrastructure provisions (i.e. water, sewage, power) for the rest of the precinct to proceed.

53. The Developer advised that this includes upgrading Townson Road to a level above the PMF to ensure flood free evacuation for the southern part of the WSP. The Developer noted that an upgraded Townson Road would provide egress to Richmond Road (a regional evacuation route) across Bells Creek without the need for further infrastructure upgrades to accommodate the development of the southern part of the WSP.

54. The Developer also noted that the assumption of 600 vehicle/lane/hour (**v/l/h**) for Richmond Road used to modelling evacuation capacity in the FEM was very conservative. The Developer advised that this assumption is akin to an outer/kerb lane with 'occasional parked cars' which is not consistent with the nature of Richmond Road. The Developer therefore modelled evacuation using an assumption of 900 v/l/h, resulting in the evacuation of the southern part of the WSP in less time than that modelled in the FEM (**Developer's FEM Review**).

55. As such, the Developer noted that previous studies are assumed to underestimate the potential flood evacuation capacity of the regional road network, with Richmond Road capacity expected to be at least 50% higher than previously adopted. On this basis, the Developer noted that the development of the southern part of WSP would add approximately one to two hours to the overall evacuation timeframe.

Council Comments

56. At its meeting with the Panel on 1 March 2023, council noted that other precincts in the NWGA had exceeded development projections due to minimum lot sizes becoming the standard rather than providing a range of lot sizes as originally anticipated. As such, densities elsewhere have exceeded the Government's anticipated yields by up to 30%, impacting on flood evacuation and urban design outcomes.

57. Council noted concerns that inadequate traffic modelling has been undertaken for the Developer's proposed road upgrades to service the southern part of the WSP.

58. Council advised that the absence of mass-transit public transport system servicing the NWGA forces residents to rely on private motor vehicles, adding to traffic congestion on the traffic network and flood evacuation routes.

59. Council raised the importance of understanding the timing and commitments to infrastructure upgrades to inform the planning for and rezoning of the remaining NWGA precincts, particularly around improvements to flood evacuation routes.

60. Council noted that there are infrastructure connections and strategic links which are not at this stage confirmed or committed to in full, such as an additional east-west crossing to the railway line, Richmond Road upgrades and the Castlereagh Connection link. Council noted that the FEM has identified the clear benefits of the two infrastructure proposals.

61. Council recommended that if staging of development is considered, infrastructure servicing needs should be considered holistically for the WSP.

TAG Advice

62. The TAG noted that the Developer primarily seeks to address the risk to life via evacuation and that reliance on evacuation alone is not advisable to reduce the risk to a tolerable level.

63. The TAG noted that any development of the WSP increases the risk to life and the number of people unable to evacuate safely, further exacerbating existing constraints on evacuation capacity in the region.

64. Additional concerns raised by the TAG relating to evacuation include the likelihood of a proportion of residents not evacuating in a timely or complete manner when warned, giving rise to the need for emergency services to engage in evacuation support and rescue activities.

65. However, TAG members were unable to provide specific comments on evacuation modelling and scenarios as these are not within the areas of expertise of the TAG members.

Agency Advice

66. In its meeting with the Panel on 21 March 2023, TfNSW noted:

- Richmond Road and the Northern Road are key evacuation routes for high-risk areas of the Hawkesbury-Nepean floodplain.
- Background growth in the NWGA already results in an increased risk to life even if no further development in the floodplain occurs.
- The 600 v/l/h assumption adopted in the FEM has been peer reviewed many times and is consistent with observed rates in large scale evacuations internationally. The rate allows for delays in road capacity in major adverse weather events. Further, the assumption is a network capacity that accounts for all intersections and cannot be compared to theoretical or observed mid-block capacity.
- Richmond Road is planned to be widened to six lanes. However, this is to accommodate for existing traffic, and will not increase the regions evacuation capacity.

67. In advice provided to the Panel on 2 April 2023, SES noted:

- The WSP would see an increase in the average annual people at risk. When combined with other proposed development within the floodplain (Marsden Park North, Riverstone, and Penrith City Centre Stage 2) there is a 60% increase in the average annual people at risk.
- The Developer's additional flood modelling and evacuation analysis is based on a number of incorrect or questionable assumptions. The modelling does not consider the impact of competing evacuation along Richmond Road following the upgrade of the South Creek crossing.
- The Developer assumes a total of 15 hours is available for residents to evacuate from the South Creek at Richmond Road location before its flood peak in a 0.2% AEP event. This may not be the case, as the Developer assumes one flood event, residents may need to participate in a staged evacuation and evacuate earlier to avoid getting stuck on regional evacuation routes and local flooding may result in flooding prior to this time.
- The Developer's FEM Review assumes 900 v/l/h, which is much higher than the adopted 600 v/l/h in the FEM. The 600 v/l/h number has been reviewed several times over the last 15 years and benchmarked against international examples. SES note there is no evidence to suggest different carrying capacities would be more appropriate.
- Inherent in all the models is that the residents above the PMF will not require evacuation. However, if those areas become isolated, even if they remain above the revised PMF level, they may require evacuation due to secondary emergencies or special needs, such as medical requirements.
- Further, the Townson Road Upgrade is reported to be above the PMF, however the current details of the upgrade indicate 0.9 m freeboard from the 0.2% AEP flood event, which is below the PMF. While SES are not aware of the design and status of this upgrade, regardless, given the 3.9 m increase in PMF levels under the Interim Results, it is unlikely that the upgrades will be above any new PMF level.

68. In advice provided to the Panel on 27 March 2023, INSW noted:

- The Stantec Flood Evacuation Report indicates that flood evacuation should be possible. However, the analysis in this report is considered preliminary and with no consideration of the cumulative impact of regional flood evacuation.
- The FEM indicates that the projected 2026 development in WSP of 680 dwellings and full 2041 development of 2,300 dwellings below the PMF, has a small increase in the number of people unable to evacuate compared to the base case, if developed in isolation to other potential developments. However, this depends on the final road layout and transport corridor along Schofields Road not creating any flood evacuation constraints, and that 100% of people respond to the order to evacuate.
- Analysis of the FEM results at a subsector level found that the WSP has a negligible impact on regional evacuation risk by itself, but when combined with other potential developments the risk was significant.
- The Developer has not modelled the cumulative impacts of the WSP proposal.

Panel Advice

69. The Panel notes that increasing the number of people living and working in the floodplain, increases risk-to-life. However, the Panel acknowledge the findings of the FEM (2,300 dwellings below the PMF in WSP) which indicate that the development of the WSP, in isolation, results in a minor change in the average annual number of people at risk in the region.

70. The Panel notes the Developer's proposed staged release of the WSP, consisting of 2,744 dwellings in the southern part of the precinct, results in only 777 dwellings below the PMF. In addition, the Developer advised that this first stage would include the Townson Road/ Meadow Road Stage 1 upgrade, which would provide flood free egress to Richmond Road for the southern part of the WSP.

71. While the Panel notes the Developer challenges the assumptions made in the FEM, the FEM is based on best practice flood modelling and sound evidence available to the NSW Government at the time. The broader conclusions for flood risk and regional evacuation capacity remain reliable and relevant.

72. The Panel recommends that any rezoning of the Precinct prioritise the development of continuous rising egress roadways to Richmond Road, noting a likely increase in the flood levels in light of the Interim Results.

73. In summary, the Panel provides the following advice for the use of land below a revised PMF:

- The Panel supports a staged rezoning of 2,300 dwellings to align with the regional evacuation capacity identified for the WSP in the FEM, given there's capacity to deliver these dwellings without unreasonably increasing 'risk-to-life'.
- The Panel notes there is a portion of the rezoning proposed above the PMF (2,500 dwellings). However, the material before the Panel indicates there is uncertainty about the revised PMF level, which could be up to 4.2 m higher than that modelled by the Developer, when considering the Interim Results. Therefore, until the revised PMF is confirmed through the revised Hawkesbury Nepean Regional Flood Study, the Panel can only at this stage support a total of 2,300 dwellings.
- Once the new PMF is adopted, then there is no limit on the number of dwellings that can be provided above the new PMF (from a flooding perspective).
- To progress additional dwellings below any new PMF, modelling should be undertaken (modelling the range of flood events, using the updated flood study data, considering climate change, cumulative impacts, and hazard mapping), to inform a risk-based assessment that will determine an appropriate location and density for those dwellings.
- Following additional flood modelling and hazard analysis, land below the revised PMF can be rezoned for a maximum capacity of 2,300 dwellings, inclusive of any dwellings that have been delivered between the old and the revised PMF.
- The ability to develop additional dwellings above the 2,300 interim cap, but below any revised PMF would subsequently be dependent on available evacuation capacity.

3.1.3 Mitigation Measures

PLUS Comments

74. PLUS noted the number of dwellings below the PMF would be restricted to ensure future residents can safely evacuate from the WSP in a major flood event. Further, controls will be included to ensure flood risk and resilience are considered for development between the 1% AEP event and PMF, including evacuation capacities and routes, mitigation of property damage and appropriate dwelling densities.

Developer Comments:

75. The Developer advised in its meeting with the Panel on 1 March 2023 that the proposed Townson Road/ Meadow Road Stage 1 Upgrade would provide flood free access and egress to the southern part of the WSP.

76. The Developer noted it has prepared a Voluntary Planning Agreement for funding and delivery of the Townson Road/ Meadow Road Stage 1 Upgrade and has reached agreement with TfNSW regarding the design for the upgrade works to Townson Road.

77. The Developer also noted that the NSW Government could improve evacuation capacity of the region if it committed to the Towson Road Stage 2 upgrade.

78. The Developer noted that it is willing to accept minimum and maximum density caps, including staging of the development, to align with infrastructure improvements and evacuation capacity.

79. Further, the Developer noted that the rezoning would introduce a new clause within the *State Environmental Planning Policy (Precincts – Western Parkland City) 2021*, clause 5.22 - Special Flood Considerations of the *Standard Instrument Local Environmental Plan* once the rezoning has been finalised. The inclusion of clause 5.22 will ensure the risks associated with flooding have been addressed.

Council Comments:

80. Council noted the experience of neighbouring precincts in that actual densities exceeded those initially predicted due to the majority of development occurring at the minimum allowable lot sizes. This presents a risk to flood evacuation capacity.

81. Council supported the use of dwelling caps for any future development of the WSP to ensure densities align with planned infrastructure upgrades.

TAG Advice:

82. TAG members noted that mitigation measures such as physical alteration to the flood plain through relevelling land or flood protection infrastructure are not proposed, and that risk to life is primarily addressed via evacuation.

Agency Advice

83. In advice provided to the Panel on 2 April 2023, SES noted that shelter-in-place is not supported in the Hawkesbury Nepean Valley due to the depth, velocity and duration of flooding and is not an endorsed flood management strategy for future development more broadly.

84. In advice provided to the Panel on 27 March 2023, INSW noted the Developer has not proposed any flood mitigation measures other than restricting development to the 1% AEP (plus freeboard) flood planning level and planning on rising road access out of the southern part of the WSP. The only mitigation measure proposed in the Material has been to limit residential development between the current 1% AEP and PMF to 2,000 dwellings.

Panel Advice

85. The Panel acknowledges the Developers key mitigation measures involve the restriction of the number of dwellings permitted below the PMF, and improved evacuation as a result of the Townson Road / Meadow Road Stage 1 upgrade.

86. The Panel concludes that any infrastructure upgrades or services must be designed having regard to the Interim Results, and additional flood modelling which has considered climate change calibrated to recent flood events.

4 The Panel's Advice

87. The Panel has undertaken a review of the WSP rezoning proposal as requested by PLUS. In doing so, the Panel has considered the Material listed in Appendix A, including submissions and additional information submitted by council, the Developer, and PLUS, as well as the advice provided by the TAG and NSW Government agencies.

88. The Panel is mindful that flooding is not a new matter and is a risk that has been factored into deliberations, strategic land use planning and decision making to this point. However, the Panel recognises there are challenges to be resolved for the WSP in response to greater awareness of flood risks and complex issues identified by the Flood Inquiry.

89. In this regard, the Panel has formed the view that the WSP has the potential to contribute to strategic land use objectives identified by both the NSW Government and council. However, it is advised that the WSP should be released in stages to ensure appropriate evacuation capacity and infrastructure improvements occur in parallel with updated flood investigations and the potential for increased housing density.

90. The Panel supports the rezoning of land above a revised PMF. In the interim, the Panel supports the staged rezoning for up to 2,300 dwellings above the currently defined PMF given the access that these dwellings would have to safe evacuation.

91. Further, rezoning below the revised PMF can proceed with a maximum capacity of 2,300 dwellings. Any additional dwellings below the revised PMF must be considerate of updated flood and hazard modelling, as well as the delivery of evacuation infrastructure.

92. The Panel notes the majority of the 2,300 dwellings located above the current PMF are within the southern part of the precinct, with a significant portion of these dwellings remaining above the revised PMF, as indicated by the Interim Results.

93. Further, the Panel notes the majority of the southern part of the WSP is controlled by a single Developer, who proposes upgrading Townson Road and the provision of lead-in infrastructure connections (i.e., water, sewage, and power) to support development in the WSP. The Panel notes the staged approach to the rezoning of WSP is comparable to the Stage 1 scheme proposed by the Developer.

94. In summary, the Panel considers that the WSP should be progressed subject to:

- **Updated flood modelling,** including:
  - modelling of a 0.02% flood event and revised flood levels for modelled events including the 1% and PMF
  - consideration of the impacts of climate change on flood levels and hazards within the Hawkesbury-Nepean catchment, including consideration of increased rainfall intensity and duration

- the findings of the Interim Results (April 2022), which highlights potential increases to flood levels for all flood events.

- **Flood hazard modelling,** including:
  - hazard mapping for all modelled events
  - analysis of the cumulative impacts of any proposed cut and fill for all modelled flood events.
- **The staged rezoning of the Precinct** to ensure development is released commensurate to updated flood modelling, improved evacuation capacity and delivery of associated infrastructure.
- **Mitigation measures** updated to ensure the Townson Road Stage 1 upgrade is designed having regard to updated flood levels, as discussed above.

95. The Panel therefore recommends, in relation to flood and evacuation matters, PLUS proceed with WSP rezoning under the following conditions and in the following sequence:

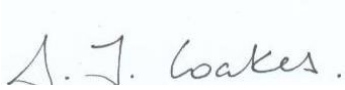
i. Proceed with rezoning for up to 2,300 dwellings above the currently defined PMF, as there is a low risk to development (both risk to life and property) from a flood perspective. This aligns with the evacuation capacity findings of the FEM.

ii. To progress additional dwellings beyond the 2,300, a revised PMF must be adopted from the Interim Results/revised Hawkesbury Nepean Regional Flood Study. Once the new PMF has been determined, updated flood modelling and hazard analysis must be undertaken for a range of flood events (including 1% AEP, 0.2% AEP, 0.02% AEP) to inform a risk-based approach to the location and density of any additional dwellings.

iii. This would ensure that the provision of additional dwellings beyond the 2,300 interim cap, and below the revised PMF, would be subject to updated flood modelling, and hazard and evacuation capacity analysis.

David Gainsford (Chair)
DPE Executive Panel Member

Chris Wilson
Panel Member



Sheridan Coakes
Panel Member

Appendix A – Material considered by the Panel

Name	Author	Date
Letter to Panel regarding the State led rezoning of West Schofields	DPE	22.22.2023
West Schofields Exhibition Discussion Paper	DPE	August 2018
West Schofields Exhibition Draft Indicative Layout Plan	Unknown	June 2018
West Schofields Exhibition Draft SEPP Maps	DPE	Undated
West Schofields Draft Indicative Layout Plan with Flood Contours	DPE	13.07.2022
Blacktown City Council Growth Centre Precincts – Schedule 9 West Schofields	DPE	August 2018
Hawkesbury-Nepean Valley Regional Flood Study	INSW	July 2019
West Schofields Flooding, Water Cycle Management and Riparian Corridor Assessment	Calibre	13.06.2018
NWGA – Marsden Park North, West Schofields & Vineyard (Stage 1) Precincts Flood Evacuation Study	Stantec	3.07.2018
Submission to Flood Advisory Panel: West Schofields - Southern Part Precinct	Calibre	March 2023
CSR West Schofields – Flood Evacuation Report	Calibre	February 2023
West Schofields Precinct: Flood Evacuation Model Review	Ason Group	March 2023
Climate Change and Flooding Effects on the Hawkesbury-Nepean	WMA Water	September 2021
Hawkesbury-Nepean Valley Flood Risk Management Strategy	INSW	July 2022
Hawkesbury-Nepean Valley Flood Evacuation Model Report	INSW	July 2022
draft Hawkesbury-Nepean Flood Study – interim results	INSW	April 2022
Technical Advisory Group – Advice Report, West Schofields Precinct	TAG	May 2023